PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-225392

(43)Date of publication of application : 21.08.2001

(51)Int.Cl. B29C 67/00
C09K 3/10
// C08J 7/00

(21)Application number : 2000-039878

(22)Date of filing : 17.02.2000

(71)Applicant : NIPPON MEKTRON LTD

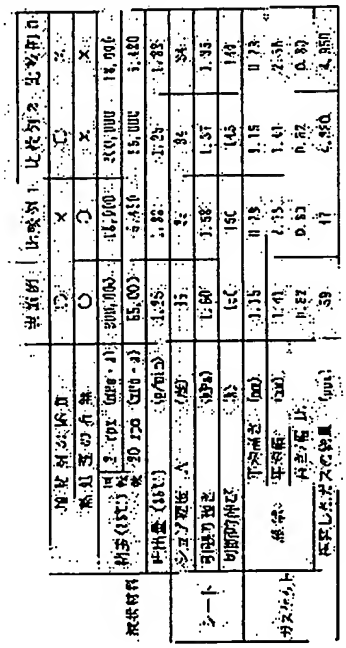
(72)Inventor : WATANABE TETSUYA
YOKOYAMA TAKASHI

(54) METHOD FOR MANUFACTURING GASKET FOR PRECISE EQUIPMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for manufacturing a gasket for a precise equipment capable of manufacturing in high productivity by performing sufficient sealing performance and using an X-Y-Z axes coating robot.

SOLUTION: After a liquid-like material having so-called high thixotropy to maintain a high viscosity in a steady state for increasing fluidity in a dynamic state applied by a stress is discharged from a nozzle of the X-Y-Z axes coating robot in a string-like state on a surface of a base of a dust preventive cover of the precise equipment, the discharged material is irradiated with an active energy beam to be cured to obtain a gasket. Thus, since the sectional shape of the discharged material can be held in an ideal sectional shape while discharging the material to the surface of the base in a good efficiency and a high productivity from the nozzle of the robot, the gasket having sufficient sealing performance can be manufactured in a high productivity.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's

decision of rejection]
[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The manufacture approach of the precision machine dexterous gasket characterized by irradiating said breathed-out liquefied ingredient, making it harden an activity energy line, and obtaining a gasket after breathing out the high liquefied ingredient of the thixotropy nature hardened by the exposure of an activity energy line in the predetermined location on the front face of a substrate from an X-Y-Z-axis spreading robot's nozzle.
[Claim 2] The manufacture approach of the precision machine dexterous gasket according to claim 1 characterized by carrying out high temperature processing of said gasket which was made to harden and was obtained.
[Claim 3] The manufacture approach of the precision machine dexterous gasket according to claim 1 or 2 characterized by using what has the compatibility high as said liquefied ingredient on said front face of a substrate.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] About the manufacture approach of the gasket used for seal of a precision mechanical equipment, also in more detailed bolting of a low load, a seal is possible for this invention, and it relates to the manufacturing method of the precision machine dexterous gasket improved so that the volatilizing capacity might decrease.
[0002]
[Description of the Prior Art] In recent years, the miniaturization of electronic equipments, such as a computer, a cellular phone, and a digital camera, progresses, and elaboration is quickly called for also for the small components used for them. Especially high-performance-izing of the hard disk drive (it expresses HDD hereafter) which is the store built in a computer also in it is remarkable.
[0003] It has structure which is not polluted with an external foreign matter in HDD in a magnetic disk, a head and a motor, and the electronic parts relevant to them and which is completely sealed like. For this reason, the macromolecule elastic body is used as a gasket generally infixed between an HDD body container and protection-against-dust covering.
[0004] On the other hand, the basis of the time background of high-performance-izing and a miniaturization of a personal computer, a word processor, etc. and HDD are asked for increase of the further storage capacity. For this reason, the clearance between the magnetic disk of HDD and a head is in the inclination which becomes still narrower.
[0005] On the other hand, the volatile component generated from the components with which narrow-ization of the clearance between the magnetic disk of HDD and a head takes for progressing, and constitutes HDD pollutes a magnetic disk, causing a memory disorder is known, and this poses a problem important now. The gasket with which the gas which volatilizes from the gasket which uses a macromolecule elastic body also stopped the yield of the volatilization gas instead of an exception is called for.
[0006] After breathing out on a substrate the liquefied ingredient which has ultraviolet-rays hardenability using an X-Y-Z-axis spreading robot in the manufacture approach of the gasket indicated by the special playback Taira No. 810594 [eight to] official report in order to solve such a trouble, the gasket of a configuration with it is manufactured by irradiating ultraviolet rays. [there is little capacity which is chemically stable simple and volatilizes, and exact]
[0007]
[Problem(s) to be Solved by the Invention] However, there are many unsolved parts also by the manufacture approach of the gasket which the amount of volatile components mentioned above as a manufacturing method of a precision machine dexterous gasket in recent years currently asked for several ppm level.
[0008] Moreover, it depends on the amount of the squeeze at the time of bolting, i.e., the cross-section height of a gasket, for the gasket configuration which can fully demonstrate the seal engine performance. For this reason, it is more advantageous to use a hyperviscous liquefied ingredient as much as possible, in case a gasket with high cross-section configuration height is manufactured using an X-Y-Z-axis spreading robot. However, use of the liquefied ingredient of

such hyperviscosity reduces the regurgitation capacity of a coater, and produces the demerit that productivity ability falls.
[0009] Then, the Japanese target of this invention demonstrates seal engine performance sufficient usable for the precision electronic equipment for which it is needed that the capacity which volatilizes from a gasket like HDD is a low very much, and is to offer further the manufacture approach of the precision machine dexterous gasket which can be manufactured for high productivity using an X-Y-Z-axis spreading robot.
[0010]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, where [dynamic] stress is applied, although a fluidity increases, in the manufacture approach of the precision machine dexterous gasket of this invention, the so-called thixotropy nature which maintains hyperviscosity in a static condition carries out the regurgitation of the very high liquefied ingredient to the shape of a string using an X-Y-Z-axis spreading robot on the substrate front face which is protection-against-dust covering of a precision mechanical equipment. Thereby, the cross-section configuration of the liquefied ingredient which breathed out the liquefied ingredient, breathing out a liquefied ingredient on a substrate front face for efficient high productivity can be held in an ideal configuration from an X-Y-Z-axis spreading robot's nozzle.
[0011] Activity energy lines, such as ultraviolet rays or an electron ray, are irradiated, and the liquefied ingredient breathed out on the substrate front face is made to harden a liquefied ingredient quickly. At this time, if perfect hardening is possible, there will be especially no problem also under an air ambient atmosphere, but if the amount (out gas nature) of the gas which volatilizes from the hardenability (tuck nature) and the gasket on the front face of a gaseous phase is taken into consideration, the exposure under inert gas ambient atmospheres, such as nitrogen, is more ideal.
[0012] The gasket which was made to harden a liquefied ingredient using an activity energy line, and was manufactured performs high temperature processing, in order to make adhesive strength with a substrate increase, and in order to remove the volatile component contained in a gasket. Although nickel-plating steel, stainless steel, aluminum, etc. are usually used by the substrate which carries out the regurgitation of the liquefied ingredient, the polar high oxide film exists in those gaseous-phase front faces. If the liquefied ingredient which contained many polar groups, such as a hydroxyl group used in this invention, at this time touches this kind of metal oxide film, the force of intermolecular physical adsorption and hydrogen bond, such as Van der Waals force, will work to an adhesion interface. therefore, high-temperature-processing **** -- since potential association used as the force of an adhesion phenomenon can be promoted by things, adhesive strength with a metal substrate is high, priming and adhesives are unnecessary, and manufacture of very few [namely,] volatilizing precision machine dexterous gaskets with very low out gas nature of capacity is attained.
[0013]
[Embodiment of the Invention] Hereafter, 1 operation gestalt of the manufacture approach of the precision machine dexterous gasket concerning this invention is explained to a detail with reference to drawing 1 thru/or drawing 6 . An X-Y-Z-axis spreading robot's outline front view used here in the manufacture approach of a precision machine dexterous gasket which drawing 1 requires for this invention, The outline side elevation of the X-Y-Z-axis spreading robot which showed drawing 2 to drawing 1 , the outline side elevation showing the condition that drawing 3 applies a liquefied ingredient on a substrate front face using the X-Y-Z-axis spreading robot which showed drawing 1 and drawing 2 , The outline perspective view explaining arrangement of the liquefied ingredient which breathed out drawing 4 on the substrate front face, the sectional view of a gasket which manufactured drawing 5 on the substrate front face, and drawing 6 are front drawings showing the result of an example.
[0014] The photo-curing mold liquefied ingredient used in the manufacture approach of the gasket of this operation gestalt will not be especially limited, if a hardening reaction is caused when activity energy lines, such as ultraviolet rays and an electron ray, are irradiated. For example, it is easy to consist of oligomer which has the double bond of polymerization nature

carbon-carbon at the end of a macromolecule chain, and a low molecular weight compound which has at least one polymerization nature carbon-carbon double bond in 1 molecule.
[0015] Generally as above photopolymerization nature oligomer, polyester acrylate, urethane acrylate, epoxy acrylate, polybutadiene acrylate, silicon acrylate, etc. can be mentioned. As a photopolymerization nature low molecular weight compound used as work of a cross linking agent or a diluent, as monoacrylate, the alkyl ester of an acrylic acid or a methacrylic acid, hydroxyalkyl ester, etc. can be mentioned, and the ester compound of an acrylic acid or methacrylic acid, and polyhydric alcohol can be mentioned as multiple-valued acrylate.
[0016] It is better to use the compound which contained polar groups, such as hydroxyl groups, such as hydroxyalkyl ester of an acrylic acid or methacrylic acid, when there was the need of raising the adhesive property of a photo-curing mold liquefied ingredient and a metal substrate, like the manufacture approach of the gasket of this operation gestalt.
[0017] Moreover, to use UV irradiation as a means to stiffen a liquefied ingredient, it is necessary to add a photopolymerization initiator further. As this photopolymerization initiator, for example, the benzoin ether, benzyl dimethyl ketal, alpha-hydroxyalkyl phenon, alpha-amino alkyl phenon, etc. can be mentioned.
[0018] In the manufacture approach of the gasket of this operation gestalt, the regurgitation of the photo-curing mold liquefied ingredient mentioned above is carried out to the shape of a string on the front face of a metal substrate using an X-Y-Z-axis spreading robot as shows drawing 1 and drawing 2 . This X-Y-Z-axis spreading robot 1 has the dispenser 2 guided and driven in the X-Y-Z-axis of a three dimension, i.e., the direction of the front and rear, right and left upper and lower sides. And while supplying high-pressure air to the dispenser 2 to like through a pipe 3, the regurgitation of the photo-curing mold liquefied ingredient is carried out to the predetermined location of the front face of the metal substrate 6 laid on the level table 5 with the pressure of high-pressure air from the nozzle 4 prepared in the lower limit of a dispenser 2. Thereby, on the front face of the metal substrate 6, as shown in drawing 3 and drawing 4 , the regurgitation of the photo-curing mold liquefied ingredient 7 can be continuously carried out without a break.
[0019] The X-Y-Z-axis spreading robot 1 does the regurgitation of the liquefied ingredient 7 on the front face of the metal substrate 6 according to the drawing pattern of the gasket configuration programmed beforehand. It depends on the ease of the regurgitation of the liquefied ingredient 7, i.e., the thixotropy nature of a liquefied ingredient, for the time amount which the drawing speed at this time, i.e., manufacture of a gasket 8, takes greatly.
[0020] Activity energy lines, such as ultraviolet rays and an electron ray, are irradiated, and the liquefied ingredient 7 breathed out on the front face of the metal substrate 6 using the X-Y-Z-axis spreading robot 1 is made to harden the breathed-out liquefied ingredient. The gasket 8 which has a cross-section configuration as shown on the front face of the metal substrate 6 at drawing 5 by this can be manufactured.
[0021] Even when the load which compresses the gasket 8 manufactured on the front face of the metal substrate 6 is low, it is the configuration which combined the rectangle and the hemicycle as it was indicated in drawing 5 as the configuration of a gasket 8 where sufficient seal engine performance can be obtained. And although the larger possible one of the value of height H of a gasket 8 and a ratio with width of face W is good, a desirable value shows an almost fixed value with the property of the liquefied ingredient to be used, and is ideal. [of the value of 0.6-1.0]
[0022] However, if the viscosity of the liquefied ingredient 7 which carries out the regurgitation on the front face of the metal substrate 6 is too low, since the fluidity of the liquefied ingredient 7 is high, before irradiating an activity energy line and stiffening the liquefied ingredient 7, a cross-section configuration begins to change, and it cannot stop in the ideal configuration which showed the cross-section configuration in drawing 5 . On the other hand, if the viscosity of the liquefied ingredient 7 which carries out the regurgitation on the front face of the metal substrate 6 is too high, since the regurgitation resistance at the time of carrying out the regurgitation will increase a liquefied ingredient from a nozzle 4, the manufacture effectiveness of the gasket 8 using the X-Y-Z-axis spreading robot 1 will fall sharply.

[0023] Then, where [dynamic] stress is applied, the liquefied ingredient used in the manufacture approach of the gasket of this operation gestalt has the so-called thixotropy nature which maintains high viscosity in the static condition, although a fluidity increases. Although this liquefied ingredient is what added thickeners, such as an inorganic bulking agent, and it is a 10,000-80,000mm Pascal second (mPa-s) at the time of per second 20 rotation (20rpm) when the viscosity in a room temperature (25 degrees C) is measured using a rotational viscometer, it is a 200,000-500,000mm Pascal second (mPa-s) at the time of per second 2 rotation (2rpm).
[0024] Since the fluidity of the liquefied ingredient 7 in case a pressure (stress) is applied like [when being breathed out from a nozzle 4] is high when such thixotropy nature uses the very high liquefied ingredient 7, the regurgitation of the liquefied ingredient can be efficiently carried out on the front face of the metal substrate 6 using the X-Y-Z-axis spreading robot 1. However, since it is wide opened from the pressure (stress) by which the load was carried out after being breathed out on the front face of the metal substrate 6, a fluidity can fall, and the ideal cross-section configuration as a gasket which rose highly can be held.
[0025] The gasket 8 manufactured on the front face of the metal substrate 6 performs high temperature processing, in order to make adhesive strength with the metal substrate 6 increase, and in order to remove the volatile component contained in a gasket 8. High temperature processing is carried out within a 80-150-degree C thermostat for about 3 to 24 hours. Moreover, as for the thermostat to be used, what the air in a tub replaces at 5 times or more of a rate by the about 0.5-1.0m [/second] wind speed in 1 hour is desirable. Or if it is possible to maintain the inside of a tub at the vacua of 10 or less torrs, it is still more ideal for removal of the volatile component of a gasket.
[0026] The urethane acrylate oligomer (average molecular weight 5000) of the polyether system prepared by processing the resultant of a polytetramethylene glycol and diphenylmethane diisocyanate by caprolactone methacrylate was used for example photopolymerization nature oligomer.
[0027] Caprolactone methacrylate was used for the reactant diluent.
[0028] 1-hydroxy cyclohexyl phenyl ketone was used for the photopolymerization initiator.
[0029] The photopolymerization nature oligomer 100 weight section mentioned above, the reactant diluent 45 weight section, and the photopolymerization initiator 2 weight section were blended, stirring mixing was carried out, and the ultraviolet curing mold liquefied ingredient was prepared.
[0030] It applied by the drawing pattern which uses the X-Y-Z-axis spreading robot 1 on protection-against-dust covering (70x100x0.4mm) for HDD made from electroless-nickel-plating aluminum of finishing [cleaning], and shows the liquefied ingredient mentioned above to drawing 4 . At this time, the bore of a nozzle 4 was 25 degrees C in 1.43mm, discharge-pressure 0.08MPa, and material temperature. Then, using the black light, ultraviolet rays were irradiated by the consistency of 8,000 mJ(s)/square cm under the air ambient atmosphere, and the liquefied ingredient was stiffened.
[0031] While slushing the liquefied ingredient mentioned above in the glass mold (20x100x2mm), ultraviolet rays were irradiated by the consistency of 8,000 mJ(s)/square cm under the air ambient atmosphere using the black light, the liquefied ingredient was stiffened, and hardness and the sheet for tension characteristic tests were created.
[0032] an example -- after adding an inorganic bulking agent into the liquefied ingredient which prepared as mentioned above and was obtained and carrying out stirring mixing, it kneaded twice by 3 roll mills, and each component was distributed. Subsequently, ultraviolet rays were irradiated and after creating the gasket for a trial, and a sheet using the liquefied ingredient made to thicken in this way, were stiffened. The obtained gasket and the sheet carried out heat treatment with the 100-degree C thermostat for 12 hours.
[0033] the example 1 of a comparison -- ultraviolet rays were irradiated and after not adding an inorganic bulking agent into the liquefied ingredient which prepared as mentioned above and was obtained but creating the gasket for a trial, and a sheet with viscosity as it is, were stiffened. The obtained gasket and the sheet carried out heat treatment with the 100-degree C thermostat for 12 hours.

[0034] What did not heat-treat on the gasket for a trial and sheet in the example mentioned above example of comparison 2 was used.
[0035] What did not heat-treat on the gasket for a trial and sheet in the example 1 of a comparison mentioned above example of comparison 3 was used.
[0036] The viscosity test fluid-like ingredient was taken in the suitable container, and the viscosity of 25 degrees C was measured with the rotational viscometer.
[0037] The liquefied ingredient was taken to the syringe (the bore of 15mm, ten cc of inner capacity) which attached the nozzle with a discharge quantity trial bore of 1.43mm, and the amount of discharge flow of the liquefied ingredient when applying the pneumatic pressure of 0.078MPa was measured.
[0038] In the sheet for a hardness test trial, the rubber degree of hardness was measured according to JISK6253.
[0039] In the sheet for a tension characteristic test trial, elongation was measured according to JISK6251 at the time of tensile strength and cutting.
[0040] In the HDD gasket for a volatilization gasometry test trial, the quantum of the gas which volatilizes by the following technique at the time of heating was performed. That is, the HDD gasket for a trial was heated at 110 degrees C under the helium purge for 18 hours, and uptake of the gas which occurred then was carried out to the adsorbent. The collection of recapture of the generating gas which carried out uptake was carried out within the purge & trap equipment which used the dynamic head space method, it was introduced into GC-MS equipment after that, and carried out quantitative analysis. The quantum was carried out by toluene conversion.
[0041] The result of having evaluated an example and the examples 1-3 of a comparison by the above-mentioned trial to drawing 6 is shown. By adding a thickener and raising the thixotropy nature of a liquefied ingredient, regurgitation capacity of a dispenser was not able to be hurt and the gasket of the ideal shape of a high semicircle of height / width-of-face ratio was able to be obtained. Moreover, generating capacity was able to be sharply decreased by carrying out high temperature processing of the gasket. Any gasket of the adhesive property with a metal substrate was good, and the adhesive property of the gasket when being in the condition of not separating at all in extent pushed strongly, and carrying out high temperature processing of the gasket further with a finger, and a metal substrate was the firm thing which can be equal to use of the usual gasket.
[0042]
[Effect of the Invention] Where [dynamic] stress is applied, although a fluidity increases, in the manufacture approach of the precision machine dexterous gasket of this invention, the so-called thixotropy nature which maintains hyperviscosity in a static condition carries out the regurgitation of the very high liquefied ingredient to the shape of a string using an X-Y-Z-axis spreading robot on the substrate front face which is protection-against-dust covering of a precision mechanical equipment, so that clearly from the above explanation. Thereby, the cross-section configuration of the liquefied ingredient which breathed out the liquefied ingredient, breathing out a liquefied ingredient on a substrate front face for efficient high productivity can be held in an ideal cross-section configuration from an X-Y-Z-axis spreading robot's nozzle. Moreover, the gasket which was made to harden a liquefied ingredient using an activity energy line, and was manufactured performs high temperature processing, in order to make adhesive strength with a substrate increase, and in order to remove the volatile component contained in a gasket. Thereby, adhesive strength with a metal substrate is high, priming and adhesives are unnecessary, and manufacture of the precision machine dexterous gasket of very few low out gas nature of capacity which volatilizes as the result is attained.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] About the manufacture approach of the gasket used for seal of a precision mechanical equipment, also in more detailed bolting of a low load, a seal is possible for this invention, and it relates to the manufacturing method of the precision machine dexterous gasket improved so that the volatilizing capacity might decrease.

[Translation done.]

* NOTICES *

PRIOR ART

[Description of the Prior Art] In recent years, the miniaturization of electronic equipments, such as a computer, a cellular phone, and a digital camera, progresses, and elaboration is quickly called for also for the small components used for them. Especially high-performance-izing of the hard disk drive (it expresses HDD hereafter) which is the store built in a computer also in it is remarkable.
[0003] It has structure which is not polluted with an external foreign matter in HDD in a magnetic disk, a head and a motor, and the electronic parts relevant to them and which is completely sealed like. For this reason, the macromolecule elastic body is used as a gasket generally infixed between an HDD body container and protection-against-dust covering.
[0004] On the other hand, the basis of the time background of high-performance-izing and a miniaturization of a personal computer, a word processor, etc. and HDD are asked for increase of the further storage capacity. For this reason, the clearance between the magnetic disk of HDD and a head is in the inclination which becomes still narrower.
[0005] On the other hand, the volatile component generated from the components with which narrow-ization of the clearance between the magnetic disk of HDD and a head takes for progressing, and constitutes HDD pollutes a magnetic disk, causing a memory disorder is known, and this poses a problem important now. The gasket with which the gas which volatilizes from the gasket which uses a macromolecule elastic body also stopped the yield of the volatilization gas instead of an exception is called for.
[0006] After breathing out on a substrate the liquefied ingredient which has ultraviolet-rays hardenability using an X-Y-Z-axis spreading robot in the manufacture approach of the gasket indicated by the special playback Taira No. 810594 [eight to] official report in order to solve such a trouble, the gasket of a configuration with it is manufactured by irradiating ultraviolet rays. [there is little capacity which is chemically stable simple and volatilizes, and exact]

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] Where [dynamic] stress is applied, although a fluidity increases, in the manufacture approach of the precision machine dexterous gasket of this invention, the so-called thixotropy nature which maintains hyperviscosity in a static condition carries out the regurgitation of the very high liquefied ingredient to the shape of a string using an X-Y-Z-axis spreading robot on the substrate front face which is protection-against-dust covering of a precision mechanical equipment, so that clearly from the above explanation. Thereby, the cross-section configuration of the liquefied ingredient which breathed out the liquefied ingredient, breathing out a liquefied ingredient on a substrate front face for efficient high productivity can be held in an ideal cross-section configuration from an X-Y-Z-axis spreading robot's nozzle. Moreover, the gasket which was made to harden a liquefied ingredient using an activity energy line, and was manufactured performs high temperature processing, in order to make adhesive strength with a substrate increase, and in order to remove the volatile component contained in a gasket. Thereby, adhesive strength with a metal substrate is high, priming and adhesives are unnecessary, and manufacture of the precision machine dexterous gasket of very few low out gas nature of capacity which volatilizes as the result is attained.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there are many unsolved parts also by the manufacture approach of the gasket which the amount of volatile components mentioned above as a manufacturing method of a precision machine dexterous gasket in recent years currently asked for several ppm level.
[0008] Moreover, it depends on the amount of the squeeze at the time of bolting, i.e., the cross-section height of a gasket, for the gasket configuration which can fully demonstrate the seal engine performance. For this reason, it is more advantageous to use a hyperviscous liquefied ingredient as much as possible, in case a gasket with high cross-section configuration height is manufactured using an X-Y-Z-axis spreading robot. However, use of the liquefied ingredient of such hyperviscosity reduces the regurgitation capacity of a coater, and produces the demerit that productivity ability falls.
[0009] Then, the Japanese target of this invention demonstrates seal engine performance sufficient usable for the precision electronic equipment for which it is needed that the capacity which volatilizes from a gasket like HDD is a low very much, and is to offer further the manufacture approach of the precision machine dexterous gasket which can be manufactured for high productivity using an X-Y-Z-axis spreading robot.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, where [dynamic] stress is applied, although a fluidity increases, in the manufacture approach of the precision machine dexterous gasket of this invention, the so-called thixotropy nature which maintains hyperviscosity in a static condition carries out the regurgitation of the very high liquefied ingredient to the shape of a string using an X-Y-Z-axis spreading robot on the substrate front face which is protection-against-dust covering of a precision mechanical equipment. Thereby, the cross-section configuration of the liquefied ingredient which breathed out the liquefied ingredient, breathing out a liquefied ingredient on a substrate front face for efficient high productivity can be held in an ideal configuration from an X-Y-Z-axis spreading robot's nozzle.
[0011] Activity energy lines, such as ultraviolet rays or an electron ray, are irradiated, and the liquefied ingredient breathed out on the substrate front face is made to harden a liquefied ingredient quickly. At this time, if perfect hardening is possible, there will be especially no problem also under an air ambient atmosphere, but if the amount (out gas nature) of the gas which volatilizes from the hardenability (tuck nature) and the gasket on the front face of a gaseous phase is taken into consideration, the exposure under inert gas ambient atmospheres, such as nitrogen, is more ideal.
[0012] The gasket which was made to harden a liquefied ingredient using an activity energy line, and was manufactured performs high temperature processing, in order to make adhesive strength with a substrate increase, and in order to remove the volatile component contained in a gasket. Although nickel-plating steel, stainless steel, aluminum, etc. are usually used by the substrate which carries out the regurgitation of the liquefied ingredient, the polar high oxide film exists in those gaseous-phase front faces. If the liquefied ingredient which contained many polar groups, such as a hydroxyl group used in this invention, at this time touches this kind of metal oxide film, the force of intermolecular physical adsorption and hydrogen bond, such as Van der Waals force, will work to an adhesion interface. therefore, high-temperature-processing **** -- since potential association used as the force of an adhesion phenomenon can be promoted by things, adhesive strength with a metal substrate is high, priming and adhesives are unnecessary, and manufacture of very few [namely,] volatilizing precision machine dexterous gaskets with very low out gas nature of capacity is attained.
[0013]
[Embodiment of the Invention] Hereafter, 1 operation gestalt of the manufacture approach of the precision machine dexterous gasket concerning this invention is explained to a detail with reference to drawing 1 thru/or drawing 6 . An X-Y-Z-axis spreading robot's outline front view used here in the manufacture approach of a precision machine dexterous gasket which drawing 1 requires for this invention, The outline side elevation of the X-Y-Z-axis spreading robot which showed drawing 2 to drawing 1 , the outline side elevation showing the condition that drawing 3 applies a liquefied ingredient on a substrate front face using the X-Y-Z-axis spreading robot which showed drawing 1 and drawing 2 , The outline perspective view explaining arrangement of the liquefied ingredient which breathed out drawing 4 on the substrate front face, the sectional view of a gasket which manufactured drawing 5 on the substrate front face, and drawing 6 are

front drawings showing the result of an example.
[0014] The photo-curing mold liquefied ingredient used in the manufacture approach of the gasket of this operation gestalt will not be especially limited, if a hardening reaction is caused when activity energy lines, such as ultraviolet rays and an electron ray, are irradiated. For example, it is easy to consist of oligomer which has the double bond of polymerization nature carbon-carbon at the end of a macromolecule chain, and a low molecular weight compound which has at least one polymerization nature carbon-carbon double bond in 1 molecule.
[0015] Generally as above photopolymerization nature oligomer, polyester acrylate, urethane acrylate, epoxy acrylate, polybutadiene acrylate, silicon acrylate, etc. can be mentioned. As a photopolymerization nature low molecular weight compound used as work of a cross linking agent or a diluent, as monoacrylate, the alkyl ester of an acrylic acid or a methacrylic acid, hydroxyalkyl ester, etc. can be mentioned, and the ester compound of an acrylic acid or methacrylic acid, and polyhydric alcohol can be mentioned as multiple-valued acrylate.
[0016] It is better to use the compound which contained polar groups, such as hydroxyl groups, such as hydroxyalkyl ester of an acrylic acid or methacrylic acid, when there was the need of raising the adhesive property of a photo-curing mold liquefied ingredient and a metal substrate, like the manufacture approach of the gasket of this operation gestalt.
[0017] Moreover, to use UV irradiation as a means to stiffen a liquefied ingredient, it is necessary to add a photopolymerization initiator further. As this photopolymerization initiator, for example, the benzoin ether, benzyl dimethyl ketal, alpha-hydroxyalkyl phenon, alpha-amino alkyl phenon, etc. can be mentioned.
[0018] In the manufacture approach of the gasket of this operation gestalt, the regurgitation of the photo-curing mold liquefied ingredient mentioned above is carried out to the shape of a string on the front face of a metal substrate using an X-Y-Z-axis spreading robot as shows drawing 1 and drawing 2 . This X-Y-Z-axis spreading robot 1 has the dispenser 2 guided and driven in the X-Y-Z-axis of a three dimension, i.e., the direction of the front and rear, right and left upper and lower sides. And while supplying high-pressure air to the dispenser 2 to like through a pipe 3, the regurgitation of the photo-curing mold liquefied ingredient is carried out to the predetermined location of the front face of the metal substrate 6 laid on the level table 5 with the pressure of high-pressure air from the nozzle 4 prepared in the lower limit of a dispenser 2. Thereby, on the front face of the metal substrate 6, as shown in drawing 3 and drawing 4 , the regurgitation of the photo-curing mold liquefied ingredient 7 can be continuously carried out without a break.
[0019] The X-Y-Z-axis spreading robot 1 does the regurgitation of the liquefied ingredient 7 on the front face of the metal substrate 6 according to the drawing pattern of the gasket configuration programmed beforehand. It depends on the ease of the regurgitation of the liquefied ingredient 7, i.e., the thixotropy nature of a liquefied ingredient, for the time amount which the drawing speed at this time, i.e., manufacture of a gasket 8, takes greatly.
[0020] Activity energy lines, such as ultraviolet rays and an electron ray, are irradiated, and the liquefied ingredient 7 breathed out on the front face of the metal substrate 6 using the X-Y-Z-axis spreading robot 1 is made to harden the breathed-out liquefied ingredient. The gasket 8 which has a cross-section configuration as shown on the front face of the metal substrate 6 at drawing 5 by this can be manufactured.
[0021] Even when the load which compresses the gasket 8 manufactured on the front face of the metal substrate 6 is low, it is the configuration which combined the rectangle and the hemicycle as it was indicated in drawing 5 as the configuration of a gasket 8 where sufficient seal engine performance can be obtained. And although the larger possible one of the value of height H of a gasket 8 and a ratio with width of face W is good, a desirable value shows an almost fixed value with the property of the liquefied ingredient to be used, and is ideal. [of the value of 0.6-1.0]
[0022] However, if the viscosity of the liquefied ingredient 7 which carries out the regurgitation on the front face of the metal substrate 6 is too low, since the fluidity of the liquefied ingredient 7 is high, before irradiating an activity energy line and stiffening the liquefied ingredient 7, a cross-section configuration begins to change, and it cannot stop in the ideal configuration which

showed the cross-section configuration in drawing 5 . On the other hand, if the viscosity of the liquefied ingredient 7 which carries out the regurgitation on the front face of the metal substrate 6 is too high, since the regurgitation resistance at the time of carrying out the regurgitation will increase a liquefied ingredient from a nozzle 4, the manufacture effectiveness of the gasket 8 using the X-Y-Z-axis spreading robot 1 will fall sharply.

[0023] Then, where [dynamic] stress is applied, the liquefied ingredient used in the manufacture approach of the gasket of this operation gestalt has the so-called thixotropy nature which maintains high viscosity in the static condition, although a fluidity increases. Although this liquefied ingredient is what added thickeners, such as an inorganic bulking agent, and it is a 10,000-80,000mm Pascal second (mPa-s) at the time of per second 20 rotation (20rpm) when the viscosity in a room temperature (25 degrees C) is measured using a rotational viscometer, it is a 200,000-500,000mm Pascal second (mPa-s) at the time of per second 2 rotation (2rpm).

[0024] Since the fluidity of the liquefied ingredient 7 in case a pressure (stress) is applied like [when being breathed out from a nozzle 4] is high when such thixotropy nature uses the very high liquefied ingredient 7, the regurgitation of the liquefied ingredient can be efficiently carried out on the front face of the metal substrate 6 using the X-Y-Z-axis spreading robot 1. However, since it is wide opened from the pressure (stress) by which the load was carried out after being breathed out on the front face of the metal substrate 6, a fluidity can fall, and the ideal cross-section configuration as a gasket which rose highly can be held.

[0025] The gasket 8 manufactured on the front face of the metal substrate 6 performs high temperature processing, in order to make adhesive strength with the metal substrate 6 increase, and in order to remove the volatile component contained in a gasket 8. High temperature processing is carried out within a 80-150-degree C thermostat for about 3 to 24 hours. Moreover, as for the thermostat to be used, what the air in a tub replaces at 5 times or more of a rate by the about 0.5-1.0m [/second] wind speed in 1 hour is desirable. Or if it is possible to maintain the inside of a tub at the vacua of 10 or less torrs, it is still more ideal for removal of the volatile component of a gasket.

[0026] The urethane acrylate oligomer (average molecular weight 5000) of the polyether system prepared by processing the resultant of a polytetramethylene glycol and diphenylmethane diisocyanate by caprolactone methacrylate was used for example photopolymerization nature oligomer.

[0027] Caprolactone methacrylate was used for the reactant diluent.

[0028] 1-hydroxy cyclohexyl phenyl ketone was used for the photopolymerization initiator.

[0029] The photopolymerization nature oligomer 100 weight section mentioned above, the reactant diluent 45 weight section, and the photopolymerization initiator 2 weight section were blended, stirring mixing was carried out, and the ultraviolet curing mold liquefied ingredient was prepared.

[0030] It applied by the drawing pattern which uses the X-Y-Z-axis spreading robot 1 on protection-against-dust covering (70x100x0.4mm) for HDD made from electroless-nickel-plating aluminum of finishing [cleaning], and shows the liquefied ingredient mentioned above to drawing 4 . At this time, the bore of a nozzle 4 was 25 degrees C in 1.43mm, discharge-pressure 0.08MPa, and material temperature. Then, using the black light, ultraviolet rays were irradiated by the consistency of 8,000 mJ(s)/square cm under the air ambient atmosphere, and the liquefied ingredient was stiffened.

[0031] While slushing the liquefied ingredient mentioned above in the glass mold (20x100x2mm), ultraviolet rays were irradiated by the consistency of 8,000 mJ(s)/square cm under the air ambient atmosphere using the black light, the liquefied ingredient was stiffened, and hardness and the sheet for tension characteristic tests were created.

[0032] an example -- after adding an inorganic bulking agent into the liquefied ingredient which prepared as mentioned above and was obtained and carrying out stirring mixing, it kneaded twice by 3 roll mills, and each component was distributed. Subsequently, ultraviolet rays were irradiated and after creating the gasket for a trial, and a sheet using the liquefied ingredient made to thicken in this way, were stiffened. The obtained gasket and the sheet carried out heat treatment with the 100-degree C thermostat for 12 hours.

[0033] the example 1 of a comparison -- ultraviolet rays were irradiated and after not adding an inorganic bulking agent into the liquefied ingredient which prepared as mentioned above and was obtained but creating the gasket for a trial, and a sheet with viscosity as it is, were stiffened. The obtained gasket and the sheet carried out heat treatment with the 100-degree C thermostat for 12 hours.
[0034] What did not heat-treat on the gasket for a trial and sheet in the example mentioned above example of comparison 2 was used.
[0035] What did not heat-treat on the gasket for a trial and sheet in the example 1 of a comparison mentioned above example of comparison 3 was used.
[0036] The viscosity test fluid-like ingredient was taken in the suitable container, and the viscosity of 25 degrees C was measured with the rotational viscometer.
[0037] The liquefied ingredient was taken to the syringe (the bore of 15mm, ten cc of inner capacity) which attached the nozzle with a discharge quantity trial bore of 1.43mm, and the amount of discharge flow of the liquefied ingredient when applying the pneumatic pressure of 0.078MPa was measured.
[0038] In the sheet for a hardness test trial, the rubber degree of hardness was measured according to JISK6253.
[0039] In the sheet for a tension characteristic test trial, elongation was measured according to JISK6251 at the time of tensile strength and cutting.
[0040] In the HDD gasket for a volatilization gasometry test trial, the quantum of the gas which volatilizes by the following technique at the time of heating was performed. That is, the HDD gasket for a trial was heated at 110 degrees C under the helium purge for 18 hours, and uptake of the gas which occurred then was carried out to the adsorbent. The collection of recapture of the generating gas which carried out uptake was carried out within the purge & trap equipment which used the dynamic head space method, it was introduced into GC-MS equipment after that, and carried out quantitative analysis. The quantum was carried out by toluene conversion.
[0041] The result of having evaluated an example and the examples 1-3 of a comparison by the above-mentioned trial to drawing 6 is shown. By adding a thickener and raising the thixotropy nature of a liquefied ingredient, regurgitation capacity of a dispenser was not able to be hurt and the gasket of the ideal shape of a high semicircle of height / width-of-face ratio was able to be obtained. Moreover, generating capacity was able to be sharply decreased by carrying out high temperature processing of the gasket. Any gasket of the adhesive property with a metal substrate was good, and the adhesive property of the gasket when being in the condition of not separating at all in extent pushed strongly, and carrying out high temperature processing of the gasket further with a finger, and a metal substrate was the firm thing which can be equal to use of the usual gasket.
[0042]

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] An X-Y-Z-axis spreading robot's outline front view used in the manufacture approach of the precision machine dexterous gasket concerning this invention.
[Drawing 2] An X-Y-Z-axis spreading robot's outline side elevation shown in drawing 1 .
[Drawing 3] The outline side elevation showing the condition of carrying out the regurgitation of the liquefied ingredient on a substrate front face using the X-Y-Z-axis spreading robot which showed drawing 1 and drawing 2 .
[Drawing 4] The outline perspective view explaining arrangement of the liquefied ingredient breathed out on the substrate front face.
[Drawing 5] The sectional view of the gasket manufactured on the substrate front face.
[Drawing 6] Front drawing showing the result of an example.
[Description of Notations]
1 X-Y-Z-axis Spreading Robot
2 Dispenser
3 Pressure Air Supply Tubing
4 Nozzle
5 Level Table
6 Metal Substrate
7 Liquefied Ingredient
8 Gasket

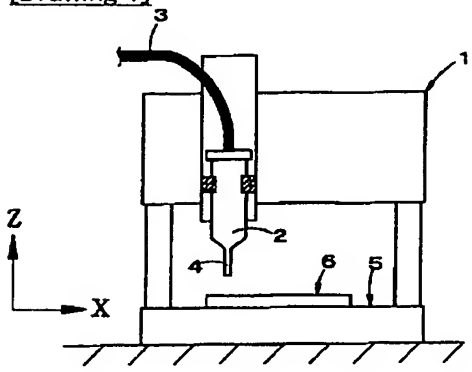
[Translation done.]

* NOTICES *

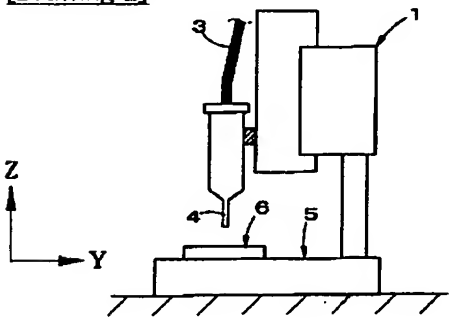
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

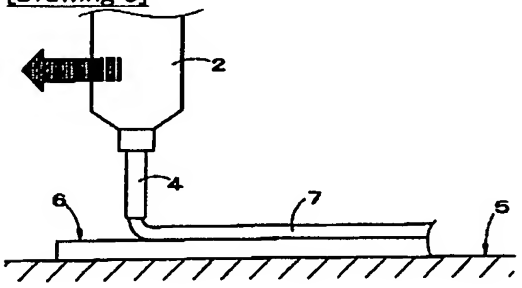
[Drawing 1]



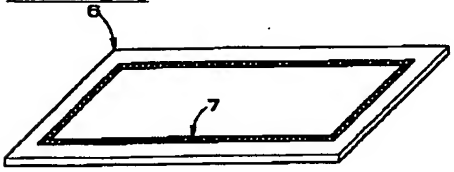
[Drawing 2]



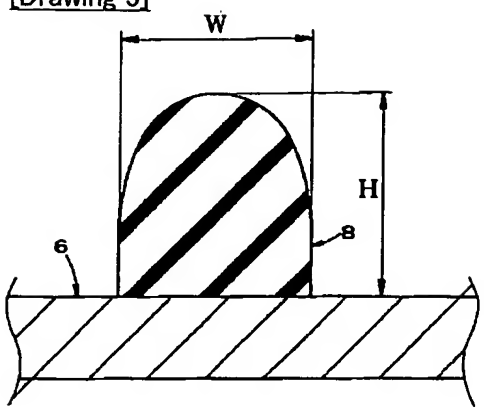
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Drawing 6]

				実施例	比較例1	比較例2	比較例3
	増粘剤の添加			○	×	○	×
	熱処理の有無			○	○	×	×
液状材料	粘度(25℃)	回転数	2 rpm (mPa・s)	300,000	18,000	300,000	18,000
			20 rpm (mPa・s)	55,000	5,420	55,000	5,420
	吐出量 (25℃) (g/min)			1.25	1.32	1.25	1.32
シート	ショア硬度 A (度)			35	35	34	34
	引張り強さ (MPa)			1.60	1.58	1.37	1.35
	切断時伸び (%)			150	150	145	140
ガスケット	形状	平均高さ (mm)		1.15	0.78	1.15	0.78
		平均幅 (mm)		1.41	2.56	1.41	2.56
		高さ/幅 比		0.82	0.30	0.82	0.30
	揮発したガスの総量 (ppm)			59	47	4,380	4,950

[Translation done.]